

CLAIMS

We claim:

- 1 1. An ultrasonic imaging system capable of producing C-Mode images and/or
2 collecting 3D image data of a target, said system comprising:
3 a housing;
4 a transducer array disposed on said housing;
5 a display unit disposed on said housing, wherein said transducer and said
6 display unit is integrated with the housing; and
7 a beamformer in communication with said system;
- 1 2. The system of claim 1, wherein said beamformer is disposed on said housing.
- 1 3. The system of claim 2, wherein said display unit lies in a plane substantially
2 parallel or exactly parallel to said transducer array.
- 1 4. The system of claim 2, wherein said display unit is adjustably mounted to said
2 housing.
- 1 5. The system of claim 4, wherein adjustment of the angle of said display unit
2 controls the slice of a 3D image set to be displayed.
- 1 6. The system of claim 2, wherein said system weighs less than about 5 pounds.
- 1 7. The system of claim 2, wherein said system weighs less than about 2 pounds.
- 1 8. The system of claim 2, wherein said housing has a volume of less than about 4
2 cubic inches.
- 1 9. The system of claim 2, wherein said housing has a volume of less than about
2 48 cubic inches.
- 1 10. The system of claim 1, wherein said display unit lies in a plane substantially
2 parallel or exactly parallel to said transducer array.

1 11. The system of claim 1, wherein said display unit is adjustably mounted to said
2 housing.

1 12. The system of claim 11, wherein adjustment of the angle of said display unit
2 controls the slice of a 3D image set to be displayed.

1 13. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed on said display unit is scaled in a manner whereby dimensions of
3 said image corresponds with dimensions of the target.

1 14. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed on said display unit is scaled in a manner that magnifies the
3 dimensions of the target.

1 15. The system of claim 14, wherein said system further comprises a user control
2 unit, wherein said image displayed on said display unit is scalable as determined by a user.

1 16. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed on said display unit is a representation of a complete 3D image.

1 17. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed on said display unit is a single slice through a complete 3D
3 image.

1 18. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed on said display unit is a C-Mode image of the tissue, whereby
3 said displayed image is obtained in a plane substantially parallel or exactly parallel to the face
4 of the transducer.

1 19. The system of claim 18, wherein said image displayed on said display unit
2 displays an animation whereby said C-Modes images are from different depths of the target,
3 said animation may be displayed simultaneously or a different times.

1 20. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed is formed by averaging at least two envelope detected images
3 from multiple parallel planes, whereby appearance of speckle in the displayed image is
4 reduced.

1 21. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed represents estimated blood flow velocities encoded in color.

1 22. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed depicts Power Doppler information.

1 23. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed depicts tissue harmonic information.

1 24. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed is formed by transmit-receiving compounding.

1 25. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed is formed by receive only spatial compounding.

1 26. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed is formed by frequency compounding.

1 27. The system of claim 1, wherein said display unit is adapted for displaying an
2 image, said image displayed depicts speckle pattern decorrelation over time as a means to
3 identify tissue or blood motion.

1 28. The system of claim 1, wherein said transducer array transmits ultrasonic
2 energy into the target, wherein the ultrasonic energy transmitted uses one or more focused
3 transmit beams.

1 29. The system of claim 1, wherein said transducer array transmits ultrasonic
2 energy into the target, wherein the ultrasonic energy transmitted uses an unfocused transmit
3 beam.

1 30. The system of claim 1, wherein said transducer array transmits ultrasonic
2 energy into the target, and said transducer array being responsive for receiving ultrasonic
3 echo signals from the target, said transducer array using a coded excitation scheme to
4 increase the effective signal to noise ratio of received echo signals.

1 31. The system of claim 1, further comprising:
2 at least one passage in communication with said system, said system being adapted to
3 correlate location of said passage with the target.

1 32. The system of claim 31, wherein a needle or tool can be inserted into said
2 passage, and said location of said needle or tool is tracked and displayed on said display unit
3 relative to said passage.

1 33. The system of claim 31, wherein at least of one said passage is disposed on at
2 least one of said transducer array and/or housing.

1 34. The system of claim 1, further comprising:
2 a marker unit, said marker unit adapted for placing one or more marks on the target.

1 35. The system of claim 1, wherein said transducer array is comprised at least in
2 part of lead zirconate titanate or some other appropriate piezoelectric material.

1 36. The system of claim 1, wherein said system weighs less than about 5 pounds.

1 37. The system of claim 1, wherein said system weighs less than about 2 pounds.

1 38. The system of claim 1, wherein said housing has a volume of less than about 4
2 cubic inches.

1 39. The system of claim 1, wherein said housing has a volume of less than about
2 48 cubic inches.

1 40. The system of claim 1, further comprising:
2 at least one removable cover, at least one said cover at least partially covering said
3 housing.

1 41. The system of claim 40, further comprising:
2 at least one adhesive device, at least one said adhesive device at least partially
3 disposed on said cover.

1 42. The system of claim 40, further comprising:
2 at least one intake disposed on said cover, said intake allowing access through said
3 cover.

1 43. The system of claim 1, further comprising:
2 at least one adhesive device, at least one said adhesive device at least partially
3 covering said housing.

1 44. The system of claim 1, further comprising:
2 at least one retaining device, at least one said retaining device at least partially
3 disposed on said housing.

1 45. The system of claim 1, wherein at least one of said housing, display, and
2 transducer array is curved.

1 46. A method of imaging a target to produce C-Mode ultrasonic images and/or
2 collecting ultrasonic 3D image data, comprising the steps of:
3 providing a housing;
4 providing a transducer array disposed on said housing, said transducer for
5 transmitting ultrasonic energy into the target and receiving ultrasonic echo signals
6 from the target;
7 beamforming said received echo signals to provide data;

8 processing said beamformed data; and
9 providing a display unit disposed on said housing, said display unit displaying
10 said processed data.

1 47. The method of claim 46, wherein said beamformer is disposed on said
2 housing.

1 48. The system of claim 31, wherein the location correlation function is achieved
2 by at least one intersection point indicator displayed on said display unit, at least one said
3 intersection point indicator corresponds with at least one desired intersection point on the
4 target and/or at least one image plane of the target.

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